

## Understanding patients' preferences

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**Title: Understanding patients' preferences: A systematic review of psychological instruments used in patients' preference and decision studies**

Running Title: Understanding patient preferences

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**Précis:** A systematic review to detect psychological instruments that may reveal crucial determinants of patients' preferences and decisional processes in healthcare settings.

## **Abstract**

**Objectives:** Research has been mainly focussed on how to elicit patient preferences, with less attention on why patients form certain preferences. The objective of the present review is to assess what psychological instruments are currently used and which psychological constructs are known to have an impact on patients' preferences and health-related decisions including the formation of preferences and preference heterogeneity.

**Methods:** A systematic database search was undertaken to identify relevant studies. From the selected studies, the following information was extracted: study objectives, study population, design, psychological dimensions investigated, instruments used to measure psychological variables.

**Results:** Thirty-three studies were identified that described the association between a psychological construct, measured using a validated instrument, and patients' preferences or health-related decisions. We identified 33 psychological instruments, and 18 constructs, and categorised the instruments into five groups, namely motivational factors, cognitive factors, individual differences, emotion and mood, and health beliefs.

**Conclusions:** This review provides an overview of the psychological factors and related instruments in the context of patients' preferences and decisions in healthcare settings. Our results indicate that measures of health literacy, numeracy and locus of control impacted on health-related preferences and decisions. Within the category of constructs that could explain preference and decision heterogeneity, health locus of control is a strong predictor of decisions in several healthcare contexts and is useful to consider when designing patient preference study. Future research should continue to explore the association of psychological constructs with preference formation and heterogeneity to build on these initial recommendations.

**Keywords**

Patient preference, psychological variables, instruments, measurements, stated preferences, decision making

## **Highlights**

### **i. What is already known about the topic?**

Patients' preferences are a growing topic of interest. There has been a call by stakeholders (e.g. regulators, payers, industry, and patient organizations) for greater involvement of patients in the healthcare decision-making process. To date, most of the attention has been focussed on how to elicit preferences, with less attention focused on why patients form certain preferences and why they make certain decisions. An overall overview of psychological dimensions and psychological instruments used in patients' preferences and health-related decision studies is lacking.

### **ii. What does the paper add to existing knowledge?**

To our knowledge, our paper is the first to review psychological constructs and instruments in the context of patients' preferences and health-related decision studies. This review identifies constructs and instruments able to evaluate the psychological profile of patients that may reveal crucial determinants of the patients' preferences and decisions and their heterogeneity in the healthcare setting(s).

### **iii. What insights does the paper provide for informing health care-related decision making? (optional)**

Our paper provides a starting point to further develop a theoretical framework for inclusion of psychological dimensions and related instruments in preference elicitation studies of medicinal products and medical devices.

## **Introduction**

Patient preferences (PP) are defined by the US Food and Drug Administration as the “relative desirability or acceptability to patients of specified alternatives or choices among outcomes or other attributes that differ among alternative health interventions”<sup>1</sup>. In medical settings, patients are often asked to decide from a variety of treatments or services. In these cases, patients are asked to engage in informed deliberation of the risks, benefits and other aspects of alternate interventions and decide between them. Researchers have developed a variety of methods for eliciting preferences<sup>1,2</sup>. While studies using these methods can provide an indication of what patients prefer, they often provide little information about why patients form certain preferences.

Although little is known about the influence of psychological variables on the construction of individuals’ preferences in health-related fields<sup>3,4</sup>, their role have been more investigated in the field of consumer behaviours<sup>5</sup>. The relationship between personality and economic preferences is notoriously spurious and no clear picture emerges from literature<sup>5-7</sup>. Evidence on the link between social preferences and personality is somewhat stronger. Significant associations have been found between trust, as well as positive and negative reciprocity and personality traits<sup>7</sup>.

Evidence on the link between locus of control and economic preferences is equally mixed<sup>8</sup>. Basic emotions which are directly related to the decision or may be anticipated from its outcome seem to play an important role in economic decision-making<sup>9,10</sup>. Less clear is whether incidental emotions, which occur at the moment of the decision but are irrelevant to the payoffs, affect economical preferences. Incidental emotions have been shown to influence stock market performance<sup>11,12</sup> but no effect have been found on preferences for public goods<sup>13</sup>.

Beliefs, attitudes and personal values seem to offer important insights into drivers of consumer preferences. Values resulted to be correlated with preferences for product category and individual differences in values significantly predicted product preference in the supermarket<sup>14</sup>.

Evaluating patients' psychological profile may therefore reveal critical determinants of the decisional processing of patients and may detect crucial factors to explain and predict PP and health-related decisions.

No systematic review has been performed to provide a framework of psychological constructs which have been assessed in PP and decision studies. The aims of this review are therefore to provide an overview and categorisation of the psychological variables and instruments used in PP and decision studies conducted in healthcare settings; to assess which psychological constructs have been shown to affect PP and decisions; to identify areas where further research is needed; and to provide first important steps towards setting up a framework that can guide researchers with directions on which psychological tools they can use in their future PP studies.

## **Methods**

### ***Search Strategy and Selection of Articles***

An exploratory search on psychological constructs and instruments used in PP studies was performed in PubMed to create a terminological framework and identify suitable search terms for a subsequent comprehensive search. The following search string was used:

((patient preference\$ OR decision making) AND (psychological factor\$ OR psychological determinant\$ OR psychological variable\$))

Following this exploration, an extended bibliographic search was conducted in Medline, PubMed, PsycINFO, EMBASE and Google Scholar. See Supplementary file 1 for the used

search strings. We progressed with a further citation search through Scopus and Web of Science. The articles identified were screened according to the following inclusion criteria:

- i) Studies that incorporate a psychological instrument in relation to PP or health-related decisions;
- ii) Studies that presented instruments' psychometric information, or used previously validated instruments;
- iii) Quantitative method studies;
- iv) Focus on human beings;
- v) Studies published from January 1, 1980 to December 30, 2016;
- vi) English language;
- vii) Full text available.

The manual review was performed in two phases. Abstracts and titles were screened to identify those relevant to the research question. When too little information was available to determine eligibility, full articles were screened. Relevant articles were then selected by cross-examining the articles by four researchers (CJ, FF, SP, SR). Disagreements in articles selection were resolved through discussion between the researchers.

### ***Data collection and extraction process***

A data extraction form was developed based on the Centre for Reviews and Dissemination templates<sup>15</sup>. Three reviewers (FF, CJ, SP) independently extracted the data. Disagreements in data extraction were resolved through discussion with a fourth author (SR). The quality of the studies was evaluated independently by two researchers (CJ, SR) with the EPHPP Quality Assessment Tool for Quantitative Studies<sup>16</sup>. This tool provides a standardised method to assess study quality leading to an overall methodological rating of strong, moderate or weak based on: selection bias; study design; confounders; blinding; data collection methods; withdrawals and dropouts; intervention integrity; analysis. The tool has been proven to be

both valid and reliable and has demonstrated the ability to adapt the most current methods of systematic literature reviews to questions related to public health<sup>16-18</sup>. Moreover, the broad adaptability of the tool to different study designs made this tool the most suitable for our quality assessment. Discordances in quality rating were resolved through discussion between the researchers. These evaluations were used to create, for each construct, an overall rating of the quality of the empirical evidence emerging from this review (Table 2).

### ***Categorisation of constructs and instruments***

A categorisation of constructs and instruments detected in the review was developed based on the classification proposed by Appelt and colleagues<sup>3</sup> in their *Decision Making Individual Differences Inventory*, a resource that categorizes and describes the most common individual difference measures used in decision-making research.

The framework of Appelt et al.<sup>3</sup> was revised to suit the needs of this review. First, we introduced a category for health beliefs as we contend that beliefs are a key factor to answering questions about preference formation, as it was already shown in different fields<sup>19</sup>. Second, risk attitudes were taken into consideration in so far that they influence risk assessment, which is the evaluation of the chance of an undesired outcome. Since risk assessment is a cognitive activity, risk attitudes are considered as factors influencing the cognitive activities underlying the decision-making process and preference formation and thus listed under cognitive factors. Third, we believe that locus of control, which Appelt and colleagues considered as a personality factor, does not indisputably belong to just one category. We accepted Appelt's suggestion to treat it as related to personality, but found necessary to assign it to its own category, listed parallel to the 'personality trait' category under the more comprehensive 'individual differences' category.

Constructs and instruments identified in this review were organised into five categories: motivational factors, cognitive factors, individual differences, emotion and mood factors, and

health beliefs. The category of cognitive factors was organised in two sub-categories, *cognitive ability and health literacy/numeracy* and *risk attitude*. Individual differences were organised in *personality and dispositional factors* and *health locus of control, autonomy and control preference*. The categorisation of constructs and instruments detected in the review was performed independently by three researchers (CJ, FF, SP). Discordances in categorisation were resolved through discussion with a fourth author (SR) until consensus was reached.

## **Results**

### ***Study selection***

The results of the systematic search are summarized in Figure 1 in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA<sup>20</sup>). Of the 2460 articles detected, 33 unique studies were identified that met the inclusion/exclusion criteria (Table 1). These publications included 33 instruments that measured 18 psychological constructs within a PP study or health-related decision-making study (Table 2).

### ***Characteristic of included studies***

The samples included in the studies reported on adult participants. Twenty-seven studies included patients, eight studies included participants from the general population.

Twenty-five studies used a cross-sectional design, three were prospective cohorts, two were interventional, and three were experimental. Using the EPHPP Quality Assessment tool for Quantitative studies<sup>16</sup>, 17 studies were rated as *strong*, 12 as *moderate* and 4 as *weak*. The overall evaluations for constructs derived from these quality assessments are reported in Table 2.

The 18 constructs and the 33 instruments identified were organised into 5 categories: 3 constructs and 6 instruments were included in motivational factors; 5 constructs and 9

measures in cognitive factors; 6 constructs and 13 measures in individual differences; 3 constructs and 4 instruments in emotion and mood factors; and 1 construct and 1 measures in health beliefs. The psychological constructs and measures identified are listed and defined in Table 2 and Table 3, respectively.

### ***Motivational factors***

Motivation is an individual's drive to engage in a specific behaviour<sup>3</sup>. It pushes individuals to fulfil their goals and influences their decisions<sup>21</sup>. Three motivational constructs were detected: self-efficacy, coping style and resilience.

Self-efficacy refers to people's beliefs about their ability to effect outcomes and exert influence on their life events<sup>22</sup>. Four validated questionnaires measuring self-efficacy were identified: the Self-Efficacy Scale<sup>23</sup>, the General Self-Efficacy Scale<sup>24,25</sup>, the Decision-Self Efficacy Scale<sup>26</sup> and the Decision Making Participation Self-Efficacy Scale<sup>27</sup>. The latter two questionnaires are specific to the decision-making domain, as they examine PP for involvement in the decision-making process<sup>27-29</sup>. Braman and colleagues<sup>30</sup> found that in the general population self-efficacy measured with the Self-Efficacy Scale did not correlate with preferences for information and involvement for decision-making after demographics were controlled. In psychiatric outpatients it has been found that the higher patients' self-efficacy measured with the General Self-Efficacy Scale, the greater their preference and their perception of participation in decision-making in psychiatric consultations<sup>29</sup>. Miller and colleagues<sup>31</sup> noticed that higher self-efficacy measured with the Decision-Self Efficacy Scale<sup>26</sup> reduces decisional conflict and increases active decision participation, which could result in higher participation rates in clinical trials. Using the Decision Making Participation Self-Efficacy Scale, Chawla et al.<sup>28</sup> found that compared to the other groups, cancer survivors preferring physician control over decision had similar self-efficacy for engaging in the

decision-making process, and lower self-efficacy for taking responsibility over decisions<sup>28</sup>. Coping strategies are defined as the habitual patterns individuals react to stress either across different situations or over time<sup>32</sup> while resilience is the ability to thrive in the face of adversity<sup>30</sup>. Two instruments measuring these constructs were detected the COPE inventory<sup>33</sup> and the Connor-Davidson Resilience scale<sup>34</sup>. Colley et al.<sup>35</sup> found that cancer patients preferring active involvement in medical decision-making more frequently used coping strategies such as positive reframing, planning and humour, compared with patients who preferred a more passive role. Moreover<sup>35</sup> patients preferring a collaborative approach were more likely to consider themselves to be resilient.

### ***Cognitive factors***

#### ***Cognitive abilities, health literacy and numeracy***

Four factors and seven instruments concerning cognitive abilities, health literacy and numeracy were identified.

Patient Activation refers to the degree to which an individual possesses knowledge, motivation, skills, and confidence to make effective health-related decisions<sup>36</sup>. Higher activation measured with The Patient Activation Measures questionnaire<sup>36</sup> is associated to preferences for involvement in medical decision-making<sup>37,38</sup>, and is associated with better reported healthcare experiences and with preference for gender-concordant care in women veterans<sup>39</sup>.

Decision-making style is the characteristic mode of perceiving and responding to decision-making tasks<sup>40,41</sup>. The General Decision-Making Inventory<sup>42</sup> categorises individuals' decision-making styles. It consists of 5 subscales describing a rational, avoidant, dependent, intuitive or spontaneous decision style. Fischer and colleagues<sup>43</sup> applied this instrument to patients who had undergone elective joint surgery to evaluate their decision style respect to the provider choice. They found that the prevailing decision style displayed by respondents

was the dependent decision style and likewise the intuitive style, followed by the rational style. In contrast, respondents hardly approached provider choice in an avoidant manner.

Health literacy refers to a patient's ability to read, understand and use healthcare information appropriately<sup>44</sup>. Four health literacy questionnaires emerged from our review. The Short Test of Functional Health Literacy in Adults<sup>45</sup>; The Rapid Estimate of Adult Literacy in Medicine<sup>46</sup> and its revised version<sup>47</sup>; The Chew's Set of Brief Screening Questions<sup>48</sup>; the eHEALS<sup>49</sup>. Patients with lower health literacy are more likely to rely on their physicians for health information, as opposed to individuals with an adequate level of health literacy who additionally use Internet and other sources of information<sup>50</sup>. When able to choose, parents with lower health literacy are more likely to vaccinate their new-born against the rotavirus than parents with higher health literacy<sup>51</sup>. Higher health literacy predicts preference for maximizing comfort and relieving pain as opposed to aggressive, life-prolonging care<sup>52</sup>. Also, patients with higher levels of health literacy prefer to have more involvement in decision-making than patients with lower levels<sup>53</sup>. Higher e-health literacy suggested higher willingness to adopt a computerised personal health record and was a better predictor than socioeconomic variables<sup>54</sup>.

The assessment of numeracy is used to understand the patient's ability to apply and manipulate numerical concepts<sup>55,56</sup>. Low numeracy measured with the Subjective Numeracy Scale<sup>55</sup> was found to be associated with biased medical decisions and may negatively influence the degree of participation in medical decision-making<sup>52,53</sup>.

### ***Risk attitude***

Risk assessment is defined as the evaluation of the chance of an undesired outcome<sup>3,57</sup>. Patients' assessment of risk is related to one's risk attitude or propensity<sup>57</sup>. Two instruments measuring risk propensity were identified in this review: Balloon Analog Risk Task<sup>58</sup> (BART) and the Domain Specific Risk Task<sup>59</sup>. Risk taking behaviour measured with the BART has

been found to be associated with older adults' preferences for independent living compared to residential care<sup>60</sup>. The Domain Specific Risk Task<sup>59</sup> assesses risk taking in five domains: financial decisions, health/safety, recreational, ethical, and social decisions. Recreational risk-taking has been associated with PP for innovative surgical techniques rather than conventional surgery<sup>61</sup>.

### *Individual differences*

#### *Personality and dispositional factors*

We identified ten psychological instruments used to measure five dispositional constructs: personality, dispositional optimism, health orientation, assertiveness, and conservatism.

Personality is “the dynamic organisation within the individual of those psychophysical systems that determine his characteristic behaviour and thought”<sup>62</sup>. The NEO-FFI, the BFI and the BFI-54 are based on the Big Five personality traits model<sup>63</sup> and describe each respondent's personality on five dimensions: extroversion, agreeableness, conscientiousness, neuroticism and openness. Cancer patients who prefer a more passive role in health-related decisions displayed lower levels of openness to experience measured with NEO-FFI than those patients who preferred a more active role in decision-making<sup>35</sup>. In a study of prostatic cancer patients small variations in personality traits measured with the BFI were associated with satisfaction with treatment decision but no significant differences in personality were observed in groups with different treatment choice<sup>64</sup>. Flynn and Smith<sup>65</sup> used 29 items of the BFI-54 in a cohort of older adults. They found that higher conscientiousness and higher openness to experience and conjointly lower agreeableness and neuroticism was associated to the most active decision-making style when deciding about health.

The Tridimensional Personality Questionnaire<sup>66</sup> is based on the Temperament and Character Model of Cloninger<sup>66</sup> which postulates the existence of seven personality dimensions: four

temperamental dimensions (Novelty-Seeking, Harm-Avoidance, Reward Dependence, Persistence) and three character dimensions (Self-Directedness, Cooperativeness, Self-Transcendence). Kesari and colleagues<sup>67</sup> found that patients' treatment preferences differed according to their score on the reward dependence dimension. Conrad and colleagues<sup>68</sup> compared the personality profile of kidney donor candidates to non-donor controls using the Temperament and Character Inventory<sup>69</sup>, which is an adaptation of the Tridimensional Personality Questionnaire. They found that the reward dependence dimension has important implications for decision-making, as it was associated with underestimating potential risk of donation.

Wolberg and colleagues<sup>70</sup> assessed the influence of patients' personality attributes on preferred options in primary breast cancer in women treatment using the Millon Clinical Multiaxial Inventory<sup>71</sup>. Three subscales of this inventory, namely psychotic thinking, avoidance and narcissism, had a stronger association with preference for the less conservative option of the elected mastectomy.

The Health Orientation Scale<sup>72</sup> assesses ten health-related personality features. Olivieri and colleagues<sup>73</sup> found that people who scored high on the personal health consciousness subscale (the tendency to think about one's physical health and fitness) were more interested and willing to gather information about genetic risk and genetic testing.

Dispositional optimism is defined as a generalized tendency to expect positive experiences in life<sup>33</sup>. Steginga and Occhipinti<sup>74</sup> found that in prostate cancer patients, greater optimism measured with The Life Orientation Test Revised<sup>75</sup> was associated with less distress related to making a treatment decision. Orom and colleagues<sup>76</sup> found that prostate cancer patients with low optimism were more likely to report that making treatment decisions was difficult and stressful.

Assertiveness involves a proactive response in difficult situations to contrast with passive or aggressive reactions<sup>77</sup>. In volunteers from the general population assertiveness measured with The Assertive-Behavior Competence Inventory for Older Adults<sup>78</sup> was predictive of desire for information and for an active role in doctor–patient interaction<sup>30</sup>.

Conservatism is defined as the disposition to preserve tradition and established institutions; to resist and oppose change<sup>79</sup>. The Right-Wing Authoritarianism Scale<sup>80</sup> was designed to evaluate political conservatism. Right-wing authoritarians are people who have a high degree of willingness to submit to authorities they perceive as legitimate, who adhere to societal conventions and who are hostile and punitive in their attitudes towards people who do not adhere to them<sup>81</sup>. No correlation was found between political conservatism and preferences for information and involvement for decision-making in the general population<sup>30</sup>.

### ***Health locus of control, autonomy and control preference***

Health locus of control is a generalised expectation about whether one's health is controlled by one's own behaviour or forces external to oneself<sup>82</sup>. An individual with an internal health locus of control believes that outcomes are a direct result of his/her own behaviour. An individual with an external health locus of control believes that outcomes are a result of either chance or powerful other people, such as physicians. Three measurements investigating patient's health locus of control have been found: the Health Locus of Control Scale<sup>82,83</sup>, the Multidimensional Health Locus of Control Scale (Form B and Form C)<sup>82,84</sup> and the Health Internal Control subscale of the Health Orientation Scale<sup>72</sup>. From our review emerges that high internal health locus of control measured with Health Locus of Control Scale was associated with preferences for complementary and alternative medicine in Japanese patients with low-back pain<sup>85</sup>. General practice patients with high external health locus of control are more likely to prefer limited involvement in decision-making processes than patients with

lower external health locus of control<sup>86</sup>. De las Cuevas and colleagues<sup>29</sup> used the Multidimensional Health Locus of Control Scale-Form C and found that psychiatric outpatients with ‘doctors’ external locus of control, and negative internal locus of control were more likely to prefer a paternalist style of decision-making. In a study involving volunteers from the general population, health locus of control measured with the Multidimensional Health Locus of Control Scale-Form B was a better predictor of preferences for information seeking and involvement in decisions compared to demographic variables such as age, sex and educational level<sup>30</sup>. Higher levels of powerful others were associated to higher preferences for information and involvement in decisions. Participants scoring highly on the Health Internal Control subscale of the Health Orientation Scale<sup>72</sup> were more likely to actively gather information about genetic testing.<sup>73</sup> Health locus of control seems to be related to preference for autonomy preferences<sup>30,86,87</sup>.

### ***Emotion and mood factors***

Emotion is defined as a complex pattern of changes, including physiological arousal, feelings, cognitive processes, and behavioural reactions, made in response to a situation perceived to be personally significant<sup>88</sup>. In contrast to emotion mood is defined as a transient, low-intensity, nonspecific, and subtle affective state that often has no definite cause<sup>89</sup>.

Four psychological instruments investigating the relationship between emotions or mood states, anxiety and depression and health-related preferences and decisions, were identified.

The Profile Of Mood States<sup>90</sup> measures six different dimensions of mood swings over a period of time . The dimensions investigated include: Tension or Anxiety, Anger or Hostility, Vigor or Activity, Fatigue or Inertia, Depression or Dejection, Confusion or Bewilderment. Higher levels in Tension and Anxiety dimension have been found in women opting for mastectomy compared to women who elected for a more conservative treatment option<sup>70</sup>.

Depression is a state of low mood and aversion to activity that can affect a person's thoughts, behaviour, feelings, and sense of well-being<sup>91</sup>. A distinction between state and trait anxiety has become commonplace<sup>92</sup>. State anxiety is defined as an unpleasant emotional arousal in face of threatening demands or dangers. Trait anxiety, on the other hand, reflects the existence of stable individual differences in the tendency to respond with state anxiety in the anticipation of threatening situations<sup>93</sup>.

Yuzbasioglu and colleagues<sup>94</sup> did not find any relationship between preferences for impression techniques in dentistry and anxiety measured with the Turkish version of the State-Trait Anxiety Inventory<sup>92</sup>. Using the Hospital Anxiety and Depression Scale<sup>95</sup>, Schneider and colleagues<sup>86</sup> discovered that the higher the depression scores the less likely patients in general practice were to want information while Franssen and colleagues<sup>96</sup> did not find any relation between anxiety and depression with preferences for communicating prognosis in esophageal cancer patients. Breast cancer patients with higher levels of depressive symptoms measured with the Center for Epidemiological Studies-Depression scale<sup>97</sup> displayed a preference for a passive role in decision-making<sup>98</sup>. In cancer patients no significant association between PP for involvement in decision-making and depression or anxiety measured with the State-Trait Anxiety Inventory and the Center for Epidemiological Studies-Depression scale was found<sup>35</sup>.

### ***Health Beliefs***

Health beliefs are defined as “the personal convictions that influence health behaviours”<sup>99</sup>. These convictions involve how people view health, health promotion and health care practices<sup>100</sup>. The Beliefs about Medicines Questionnaire<sup>101</sup> assesses treatment-related beliefs that is the specific patient's perception of the need to take medication and concerns about it as well as the general beliefs about pharmacotherapy<sup>101</sup>. In patients with schizophrenia, a

negative attitude towards medications was related to preferring a higher involvement in decision-making<sup>102</sup>.

## **Discussion**

Given the increasing recognition of the importance of PP in healthcare, it is important to understand which psychological dimensions and profiles associate with the formation and heterogeneity of preferences. Therefore, a systematic review was conducted to enhance understanding of which psychological constructs and instruments have been investigated in the context of PP or health-related decisions.

A total of 18 constructs and 33 instruments were identified and organised into five categories: motivational factors, cognitive factors, individual differences, emotion and mood factors, and health beliefs. There is no agreement or systematic categorisation of the constructs involved in PP construction or decision-making, even though researchers have been urged to explore this topic<sup>3,4</sup>. Given the interconnectedness and complexity of the constructs considered here, it is recognised that this classification may be arbitrary and some categories may overlap. All of the constructs we reviewed are highly complex and should be considered as a part of a manifold system of psychological characteristics that influence each other. Our categorisation is still a useful way to describe the psychological variables and the instruments detected and may function as initial guide to encourage a constructive discussion and a synergy effort in the field.

Amongst motivational constructs self-efficacy was promising. The concept of self-efficacy has been assessed consistently across decision-making studies in healthcare settings. Even though past literature has highlighted its important role in decision-making<sup>103</sup>, to our knowledge there are no studies that directly assess the relationship between self-efficacy and PP construction. Coping strategies and resilience are only moderately established in PP and decisions literature. Although of high quality, only one study was captured by our search and

no strong conclusion can be therefore drawn.

We found a few cognitive constructs to be related to PP and decisions. Patient activation and decision-making style are not so well investigated. Health literacy and numeracy are more established in health-related preference and decisions literature. These factors were found to predict PP and decisions in different scenarios throughout articles from strong to moderate quality. It is noticeable that e-health literacy were a better predictor of PP compared to socioeconomic variables<sup>54</sup>. As only one study, weak in quality, investigated this relationship, we advocate further investigation to confirm this evidence.

In the category of cognitive factors, we found a surprisingly small number of studies (2) exploring the relationship between PP and risk propensity. The low quality of the studies limit even further the conclusions we can draw. The limited research exploring the role of risk propensity in PP may be related to the difficulties associated to its operational definition. One view considers risk propensity as an unstable trait across domains<sup>104</sup>. According to this vision the variation in risk-taking can be ascribed to an individual perceived-risk attitude and tends to be more stable across different domains than economic risk<sup>105</sup>. Finally, in the healthcare setting, our search points out that the risk-taking attitudes might be more intrinsic to the patient as it has been shown by considering personality traits through instruments such as the Sensation Seeking Scale Form<sup>106</sup>.

Amongst individual differences, personality traits and dispositional factors have been studied more holistically in the context of PP and decisions. Overall, the personality measures are well-known and validated across settings. However, there is no consistent evidence regarding the influence of specific personality dimensions in PP and decisions. On the contrary, the number, quality and findings of studies detected by our study highlight that a relevant role in PP and decisions is played by health locus of control.

Concerning emotions and mood factors, the findings about the relationship between anxiety

and depression and PP are still ambiguous. Even though the studies we considered were scientifically robust, so far there is not enough evidence to establish a specific relationship.

Health beliefs that have been considered with regard to PP are the ones concerning medications. A more consistent body of literature is needed to support the role of beliefs in PP and health-related decisions.

The current review gives an overview of the existing research on psychological constructs and instruments that impact PP and decisions in healthcare. The most prominent results are related to health literacy, numeracy, and health locus of control which have shown to influence PP and decisions and whose measurements have shown consistent results. Self-efficacy and health-beliefs are promising fields of study, but the amount or quality of existing results is not yet satisfactory. The impact of risk propensity is also difficult to assess. Evidence of the impact of personality traits and mood states was inconsistent. Further research is needed to ascertain the impact of such factors.

In conclusion, it is important to clarify that many of the factors and measures identified might be relevant to some extent to enhance understanding of PP in healthcare settings, however, further evaluations of which of instruments are most useful is needed. As this is a relatively nascent area of research, it is important to develop a common framework to further facilitate sharing of information and the accumulation of evidence to demonstrate how specific psychological constructs relate to preference formation or preference heterogeneity. Moreover, there is a need to focus on the clinical feasibility of including psychological measurements in preference and decision studies.

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**Table 1. Description of the characteristics of the studies presented in the review**

Authors	Title	Country	Year	Objective	Design	Participants	Measure	Construct	Quality of the study	Cluster				
										Ind. Diff.	Mot.	Cog	H. Bel.	Emo t
Block, C. A., Erickson, B., Carney-Doebbling, C., Gordon, S., Fallon, B., & Konety, B. R.	Personality, treatment choice and satisfaction in patients with localized prostate cancer.	USA	2007	Evaluate whether patients' personality influence treatment choice and overall treatment satisfaction.	Cross-sectional study	219 prostate cancer patients	The Big Five Inventory (BFI)	Personality	Strong	x				
Braman, A.C. & Gomez, R.G.	Patient personality predicts preference for relationships with doctors.	USA	2004	To assess the role of personality variables over and above demographic variables for predicting the type of relationships patients prefer with their doctors—from giving all the decision-making power to the doctors to a more egalitarian, information-seeking relationship.	Cross-sectional study	120 volunteers randomly selected from a pool consisting of 1300 primarily White, middle-class individuals residing in the metropolitan Saint Louis area.	The Multidimensional Health Locus of Control Questionnaire (MHLC); Assertive-Behavior Competence Inventory for Older Adults; The Self-Efficacy Scale; the Right-Wing Authoritarianism Scale;	Self-Efficacy Health Locus of Control Assertiveness Conservatism	Moderate	x	x	x		

Chawla N. & Arora N. K.	Why do some patients prefer to leave decisions up to the doctor: lack of self-efficacy or a matter of trust?	USA	2013	Assess cancer patients' decision-making preferences, the role of trust and self-efficacy, and the effect of preferences on health outcomes.	Cross-sectional study	623 bladder, leukaemia, and colorectal cancer survivors	Trust in Physician Scale; Decision Making Participation Self-Efficacy Scale	Interpersonal Trust Self-Efficacy	Strong	x	x			
Colley, A., Halpern, J., Paul, S., Micco, G., & Lahiff M.	Factors associated with oncology patients' involvement in shared decision making during chemotherapy	USA	2016	Evaluate the association of symptoms and psychological adjustment characteristics (e.g. coping styles and personality traits) and decision-making roles.	Cross-sectional study	862 oncology outpatients receiving chemotherapy	The Center for Epidemiological Studies-Depression scale (CES-D); The Spielberger State-Trait Anxiety Inventories (STAI-T and STAI-S); The Connor-Davidson Resilience Scale; The Brief COPE scale; The NEO Five-Factor Inventory (NEO-FFI)	Anxiety and Depression Resilience Coping	Strong	x	x			x
Conrad, R., Kleiman, A., Rambau, S., Wegener, I., Mücke, M., Dolscheid-Pomerich, R.C., Zur, B., & Geiser, F.	Psychosocial assessment of living kidney donors: What implications have temperament and character for decision-making?	Germany	2016	Compare the personality of kidney donor candidates to non-donor controls and analyse the personality profile of candidates which are psychosocially at risk.	Cross-sectional study	49 living kidney donors	Temperament and Character Inventory (TCI)	Temperament	Moderate	x				
Deen, D., Lu, W. H., Rothstein, D., Santana, L., & Gold, M. R.	Asking questions: The effect of a brief intervention in community health centers on patient activation	USA	2011	To evaluate the impact of a patient activation intervention focused on building question formulation skills.	Intervention study	252 patients in community health centres	Patient Activation Measure (PAM)	Patient activation	Moderate			x		

De las Cuevas, C., Peñate, W., & de Rivera, L.	Psychiatric patients' preferences and experiences in clinical decision-making: Examining concordance and correlates of patients' preferences.	Spain	2014	To assess the concordance between patients' preferred role in clinical decision-making and the role they usually experience in psychiatric consultations and to analyse the influence of socio-demographic, clinical and personality characteristics on patients' preferences.	Cross-sectional study	507 adult consecutive psychiatric outpatients	General Perceived Self-Efficacy Scale; Multidimensional Health Locus of Control (MHLC) Form C Scale	Self-efficacy  Health Locus of Control	Strong	x	x			
Fischer, S., Soyez, K., & Gurtner, S.	Adapting Scott and Bruce's General Decision-Making Style Inventory to Patient Decision Making in Provider Choice	Germany	2015	Examine the conceptuality of Scott and Bruce's General Decision-Making Style Inventory with respect to patient choice situations.	Experimental study	388 German elective surgery patients	Patient Decision-Making Style Inventory	Decision-Making Style	Strong			x		
Flynn, K. E. & Smith, M. A	Personality and Health Care Decision-Making Style	USA	2007	Examine the relationships between five factors of personality and four preference types relevant for health care decision-making process	Cross-sectional study	5830 men and women who graduated from Wisconsin high schools	54-item Big Five Inventory (BFI-54)	Personality	Strong	x				

Franssen, S. J., Lagarde, S. M., van Werven, J. R., Smets, E., Tran, K. T., Plukker, J. T. M., ... & de Haes, H. C.	Psychological factors and preferences for communicating prognosis in esophageal cancer patients.	the Netherlands	2009	To assess how patients' psychological characteristics relate to patients' preferences concerning the disclosure of prognosis.	Cross-sectional study	176 esophageal cancer patients	Hospital Anxiety and Depression Scale (HADS)	Depression Anxiety	Strong						x
Gaglio, B., Glasgow, R.E., & Bull S.S.	Do patient preferences for health information vary by health literacy or numeracy? A qualitative assessment.	USA	2012	To assess how patients, with varying health literacy and health numeracy abilities, (a) obtain their health information and (b) which are their preferences for receiving health information.	Cross-sectional study	150 patients at risk for cardiovascular disease	Short Test of Functional Health Literacy in Adults (s-TOFHLA)	Health literacy	Weak			x			
Goggins, K. M., Wallston, K.A., Nwosu, S., Schildcrout, J.S., Castel L., & Kripalani, S.	Health literacy, numeracy, and other characteristics associated with hospitalized patients' preferences for involvement in decision-making.	USA	2014	Assess patient decisional preference in a hospital setting.	Prospective cohort study	1,249 hospitalized patients with cardiovascular diseases	Subjective Numeracy Scale (SNS) + short form of the s-TOFHLA	Health literacy Numeracy	Strong			x			
Hamann, J., Mendel, R., Reiter, S., ... & Berthele, A.	Why do some patients with schizophrenia want to be engaged in medical decision making and others do not?	Germany	2011	Determine why some patients want to participate in medical decision making and others do not.	Cross-sectional study	203 patients, 101 with schizophrenia and 102 with multiple sclerosis	Beliefs about Medicines Questionnaire (BMQ)	Beliefs about medicines	Moderate				x		

Hashimoto H., & Fukuhara S.	The influence of locus of control on preferences for information and decision making	Japan	2004	Investigate the relationship between preference for information and that for decisional autonomy in medical encounters.	Cross-sectional study	3395 Japanese over the age of 18	HLCS	Health Locus of Control	Strong	x				
Hyphantis T., Almyroudi A., Paika V., Degner L. F., Carvalho A.F. & Pavlidis N.	Anxiety, depression and defence mechanism associated with treatment decisional preferences and quality of life in non-metastatic breast cancer: a 1-year prospective study	Greece	2013	Assess psychological correlates of treatment, decisional preferences and predictors of patients' health related quality of life.	Prospective cohort study	82 women with early non-metastatic breast cancer	CES-D Scale; the Spielberger's State-Trait Anxiety Inventory (STAI-S, STAI-T).	Depression Anxiety	Strong					x
Kesari, D., Benjamin, J., Podberzsky, A., Yulish, E., Lobik, L., Sumalinsky D., & Cytron S.	Influence of Demography and Personality on Patient Choice of Treatment in Symptomatic Benign Prostate Hyperplasia	Israel	2015	Examine whether patients' demography and personality affect their decision regarding the type of treatment.	Cross-sectional study	105 BPH patients	Tri-dimensional personality questionnaire (TPQ)	Personality	Weak	x				
Kimerling, R., Pavao, J., & Wong, A.	Patient activation and mental health care experiences among women veterans.	USA	2016	To examine associations between patient activation and mental health care experiences and concordant care for gender-related preferences	Cross-sectional study	2466 women veterans who reported past-year utilization of mental health services	Patient Activation Measure (PAM-13)	Patient activation	Strong			x		

Miller, S., Hudson, S., Egleston, B., Manne, S., Buzaglo, J., Devarajan, K., ... Meropol, N.	The relationships among knowledge, self-efficacy, preparedness, decisional conflict and decisions to participate in a cancer clinical trial	USA	2013	To analyse variables that have a role in preparing for participation in cancer clinical trials.	Cross-sectional study	105 cancer patients	Ottawa Decision Self-Efficacy scale (ODSES); DCS.	Self-efficacy	Moderate		x			
Morrow, D. G., Weiner, M., Steinley, D., Young, J., & Murray, M. D.	Patients' health literacy and experience with instructions: Influence Preferences for Heart Failure Medication Instructions	USA	2007	Assess a pharmacist-based patient education intervention to improve older adults' adherence to chronic heart failure (CHF) medications.	Intervention study	236 elder volunteers diagnosed with CHF	Short Test of Functional Health Literacy in Adults (s-TOFHLA)	Health literacy	Moderate			x		
Noblin, A.M., Wan, T., Fottler, M.	The impact of health literacy on a patient's decision to adopt a personal health record.	USA	2012	Make predictions on the use of a personal health record based on an individual's intentions as well as the individual attributes of age, education, and household income.	Cross-sectional study	562 patients	eHEALS	eHealth literacy	Weak			x		
Oliveri, S., Masiero, M., Arnaboldi, P., Cutica, I., Fioretti, C., & Pravettoni, G.	Health Orientation, Knowledge, and Attitudes toward Genetic Testing and Personalized Genomic Services: Preliminary Data from an Italian Sample.	Italy	2016	To assess personality tendencies and orientations that could be closely correlated with knowledge, awareness, and preference toward undergoing direct to consumer genetic testing	Cross-sectional study	145 young adults and adults with at least a bachelor degree	Health Orientation Scale (HOS)	Health-related personality features. Status	Strong	x				

Ono, R., Higashi, T., Suzukamo, Y., Konno, S., Takahashi, O., Tokuda, Y., ... & Fukui, T.	Higher internality of health locus of control is associated with the use of complementary and alternative medicine providers among patients seeking care for acute low-back pain.	Japan	2018	To examine the relationship between preference for the use of complementary and alternative medicine and internality of health locus of control in persons with low-back pain.	Cross-sectional study	81 persons who newly sought care for low-back pain	Health Locus of Control scale	Patient's health locus of control	Moderate	x				
Orom, H., Penner, L. A., West, B.T., Downs, T.M., Rayford, W., & Underwood W.	Personality predicts prostate cancer treatment decision-making difficulty and satisfaction	USA	2009	Investigate the roles of dispositional optimism and self-efficacy in prostate cancer treatment decision-making difficulty and satisfaction.	Cross-sectional study	125 patients with prostate cancer	Revised Life Orientation Test (LOT-R)	Optimism/pessimism	Strong	x	x			
Schneider, A., Koerner, T., Mehring, M., Wensing, M., Elwyn, G., & Szecsenyi J.	Impact of age, health locus of control and psychological co-morbidity on patients' preferences for shared decision making in general practice	Germany	2006	The aim of this study was to explore if patients' preferences to be involved in decision-making correlates with reasons for encounter, psychological or demographic characteristics.	Cross-sectional study	234 adult patients who attended their physician in the study period	Hospital Anxiety and Depression Scale (HADS)	Anxiety Depression Health Locus of control	Strong	x				x

Seaman K.L., Stillman C.M., Howard D.V., Howard J.H. Jr	Risky decision-making is associated with residential choice in healthy older adults.	USA	2015	Investigate the relationship between residential choice and decision-making	Experimental study	46 old adults	Balloon Analog Risk Task (BART)	Propensity to risk	Weak			x		
Seo, J., Goodman, M. S., Politi, M., Blanchard, M., & Kaphingst, K. A.	Effect of Health Literacy on Decision-Making Preferences among Medically Underserved Patients.	USA	2016	Examine the relationship between health literacy and decision-making preferences in a medically underserved population.	Cross-sectional study	576 primary care patients	Rapid Estimate of Adult Literacy in Medicine - Revised (REALM-R)	Health literacy	Strong			x		
Smith S.G., Pandit A., Rush S.R., Wolf M.S., & Simon, C.J.	The Role of Patient Activation in Preferences for Shared Decision Making: Results From a National Survey of U.S. Adults.	USA	2016	Investigate the relationship between patient activation and preferences for SDM in 6 common medical decisions.	Cross-sectional study	3400 patients	PAM	Patient activation	Moderate			x		
Steginga S. K., & Occhipinti S.	Dispositional Optimism as a Predictor of Men's Decision-Related Distress after localized Prostate Cancer	Australia	2006	Investigate the relationship between optimism, threat appraisal, seeking support and information, cognitive avoidance, physical treatment side effects, and decision-related distress.	Prospective study	111 men with localized prostate cancer	LOT-R; DCS	Optimism	Moderate	x				

Sulza, M.C., Zerz, A, Sagmeistera, M., Roll, T., Meyenbergera, C.	Perception of preference and risk-taking in laparoscopy, transgastric, and rigid-hybrid, transvaginal NOTES for cholecystectomy	Switzerla nd	2013	To investigate patients' perceptions of new cholecystectomy techniques, in the context of the patients' risk behaviours	Cross-se ctional study	14 inpatients attending laparoscopy	Domain Specific Risk Attitude Scale (DOSPERT)	Propensity to risk	Moderate	x				
Veldwijk, J., van der Heide, I., Rademakers, J., Schuit, A. J., de Wit, G. A., Uiters, E., & Lambooj, M. S.	Preferences for vaccination: does health literacy make a difference?	The Netherlan ds	2015	To examine to what extent health literacy is associated with parental preferences concerning childhood rotavirus vaccination	Cross-se ctional study	467 Dutch parents of newborns aged 6 weeks	Chew's Set of Brief Screening Questions (SBSQ)	Health literacy	Moderate			x		
Volandes, A. E., Paasche-Orlow, M., Gillick, M. R., Cook, E. F., Shaykevich, S., Abbo, E. D., & Lehmann, L.	Health Literacy not Race Predicts End-of-Life Care Preferences	USA	2008	To assess whether end-of-life preferences and decision-making may be due to disparities in health literacy.	Cross-se ctional study	144 subjects which visited their primary care doctors.	REALM	Health literacy  Numeracy	Strong			x		
Wolberg, W.H., Tanner, M. A., Romsaas, E. P., Trump, D. L., & Malec, J. F.	Factors Influencing Options in Primary Breast Cancer Treatment	USA	1987	Compare psychological and demographic variables between patients who chose mastectomy and those who chose conservation.	Cross-se ctional study	110 breast cancer patients	Profile of Mood States (POMS); HLCS; Millon Clinical Multiaxial Inventory (MCMI)	Transient mood (POMS)  Health locus of control  Personality style and personality disorders	Strong	x				x

Yuzbasioglu, E., Kurt, H., Turunc, R., & Billir, H.	Comparison of digital and conventional impression techniques: evaluation of patients' perception, treatment comfort, effectiveness and clinical outcomes	Turkey	2014	Compare two impression techniques from the perspective of patient preferences and treatment comfort.	Experimental study	24 healthy volunteers	STAI-T	Trait anxiety	Moderate							x
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**Table 2. List of Psychological Constructs and Instruments Identified During the Systematic Literature Review.**

Category/ Subcategory	Construct	Description of Construct	Overall quality of studies <sup>a</sup>	Number of studies	Instruments	
Motivational factors	Self-efficacy	Self-efficacy is an individual's belief in his or her capacity to master the cognitive, motivational, and behavioural resources required to perform in a given situation <sup>22</sup> .	Moderate to Strong	4	<ul style="list-style-type: none"> <li>• Self-Efficacy Scale</li> <li>• Decision making participation self-efficacy scale</li> <li>• Decision self-efficacy scale</li> <li>• General Perceived Self-Efficacy scale</li> </ul>	
	Resilience	Resilience is defined as the process of adapting well in the face of trauma, adversity, threats, tragedy, and sources of stress <sup>107</sup> .	Strong	1	<ul style="list-style-type: none"> <li>• Connor Davidson Resilience Scale</li> </ul>	
	Coping style	Coping style is defined as the habitual pattern individuals react to stress either across different situations or over time <sup>32</sup> .	Strong	1	<ul style="list-style-type: none"> <li>• The COPE Inventory</li> </ul>	
Cognitive factors and s	Cognitive abilities	Patient Activation	Patient activation refers to the degree to which an individual possesses knowledge, motivation, skills, and confidence to make effective health-related decisions <sup>36</sup> .	Moderate	3	<ul style="list-style-type: none"> <li>• Patient Activation Measure Questionnaire</li> </ul>
		Health literacy	Health literacy is the patient's ability to read, understand and use healthcare information appropriately <sup>44</sup> .	Moderate	7	<ul style="list-style-type: none"> <li>• Rapid Estimate of Adult Literacy in Medicine</li> <li>• Short test of Functional Health Literacy in Adults</li> <li>• E-health literacy eHEALS</li> </ul>

						<ul style="list-style-type: none"> <li>• Chew's Set of Brief Screening Questions</li> </ul>
		Numeracy	Numeracy refers to the ability to apply and manipulate numerical concepts <sup>56,108</sup> .	Strong	2	<ul style="list-style-type: none"> <li>• Subjective Numeracy scale</li> </ul>
		Decision-making styles	Decision-making style is the "habitual pattern individuals use in decision making", or characteristic mode of perceiving and responding to decision-making tasks <sup>40,41</sup> .	Strong	1	<ul style="list-style-type: none"> <li>• General Decision-Making Inventory</li> </ul>
						<ul style="list-style-type: none"> <li>•</li> </ul>
						<ul style="list-style-type: none"> <li>•</li> </ul>
	Risk Attitudes	Risk propensity	Risk propensity is described as a function of the person's perception of risk and the person's willingness to take on this risk <sup>105</sup> .	Moderate to weak	2	<ul style="list-style-type: none"> <li>• Domain specific risk task</li> <li>• Balloon Analog Risk Task</li> </ul>
Individual differences	Personality and dispositions	Personality	Personality is "the dynamic organisation within the individual of those psychophysical systems that determine his characteristic behaviour and thought" <sup>62</sup> .	Moderate to strong	6	<ul style="list-style-type: none"> <li>• NEO Five Factor Inventory</li> <li>• Big Five Inventory</li> <li>• Millon Clinical Multiaxial Inventory</li> <li>• Tridimensional Personality Questionnaire</li> <li>• Temperament and Character Inventory</li> </ul>
		Dispositional optimism	Dispositional optimism is defined as generalized expectancy for positive future events <sup>109</sup> .	Moderate to strong	2	<ul style="list-style-type: none"> <li>• Life Orientation Test-Revised</li> </ul>

		Health orientation	Health orientation is an individual-differences concept defined as an individual's motivation to engage in healthy attitudes, beliefs, and behaviours <sup>110</sup> .	Strong	1	<ul style="list-style-type: none"> <li>• Health Orientation Scale</li> </ul>
		Assertiveness	Assertiveness is a proactive response in difficult situations to contrast with passive or aggressive reactions <sup>77,78</sup> .	Moderate	1	<ul style="list-style-type: none"> <li>• The Assertive-Behavior Competence Inventory</li> </ul>
		Conservatism	Conservatism is defined as the disposition to preserve tradition and established institutions; to resist and oppose change <sup>79,80</sup> .	Moderate	1	<ul style="list-style-type: none"> <li>• The Right-Wing Authoritarianism Scale</li> </ul>
	Health locus of control	Health locus of control is defined as a generalized expectation about whether one's health is controlled by one's own behaviour or forces external to oneself <sup>82</sup> . An individual with an internal locus of control believes that outcomes are a direct result of his or her own behaviour. An individual with an external locus of control believes that outcomes are a result of either chance or powerful other people, such as physicians.	Strong	8	<ul style="list-style-type: none"> <li>• Health Locus of Control Scale</li> <li>• Form B of the Multidimensional Health Locus of Control Scale</li> <li>• Form C of the Multidimensional Health Locus of Control Scale</li> <li>• Health Internal Control subscale of the Health Orientation Scale</li> </ul>	
Emotion and mood factors	Mood states	In contrast to emotion mood is defined as a transient, low-intensity, nonspecific, and subtle affective state that often has no definite cause <sup>89</sup> .	Strong	1	<ul style="list-style-type: none"> <li>• Profile of mood states</li> </ul>	

	Anxiety	A distinction between state and trait anxiety has become commonplace <sup>92</sup> . State anxiety is defined as an unpleasant emotional arousal in face of threatening demands or dangers. A cognitive appraisal of threat is a prerequisite for the experience of this emotion <sup>93</sup> . Trait anxiety, on the other hand, reflects the existence of stable individual differences in the tendency to respond with state anxiety in the anticipation of threatening situations.	Strong	3	<ul style="list-style-type: none"> <li>• Hospital Anxiety and Depression Scale</li> <li>• The Spielberger's State-Trait Anxiety Inventory</li> </ul>
	Depression	Depression is a state of low mood and aversion to activity that can affect a person's thoughts, behaviour, feelings, and sense of well-being <sup>91</sup> .	Strong	4	<ul style="list-style-type: none"> <li>• Hospital Anxiety and Depression Scale</li> <li>• The Center for Epidemiological Studies-Depression scale</li> </ul>
Health beliefs	Treatment-related beliefs	Treatment-related beliefs are defined as the specific patient's perception of the need to take medication and concerns about it as well as the general beliefs about pharmacotherapy <sup>101</sup> .	Moderate	1	<ul style="list-style-type: none"> <li>• The Beliefs about Medicines Questionnaire</li> </ul>

<sup>a</sup> Each study received a score based on its quality ranging from 1 to 3 (1=weak; 2=moderate; 3=strong), then summed to the score of the other studies investigating the same construct and the mathematical average of the resulting value was categorised as follow: from 1 to 1.4 *weak*; from 1.41 to 1.8 *weak to moderate*; from 1.81 to 2.2 *moderate*; from 2.21 to 2.6 *moderate to strong*; from 2.61 to 3 *strong*.

**Table 3. Summary of Characteristics of Reviewed Instruments**

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)
Motivation measures	Self-Efficacy Scale	1982	Self-report questionnaire	23	7-point scale ranging from 1 (strongly agree) to 7 (strongly disagree)	2	Internal consistency, temporal stability, and Construct validity	Chronbach alpha from 0.85 to 0.88 Test-retest reliability from .60 to .93 <sup>23,30,111</sup>	>20	Self-efficacy
	General Self Efficacy Scale	2002	Self-report questionnaire	10	4-point scale from 'not at all true' to 'exactly true'	None	Internal validity	Chronbach alpha from 0.91 to 0.75 Test-retest reliability from 0.69 to 0.80 <sup>24</sup>	32	Self-efficacy
	Decision-Self Efficacy Scale	1995	Self-report questionnaire	11	5-point scale ranging from "Not at all confident" to "Very confident"	None	Validity according to the authors that developed the measure	Chronbach alpha from 0.86 to 0.92 <sup>26</sup>	< 5	Self-Efficacy
	Decision Making Participation Self Efficacy Scale	2009	Self-report questionnaire	5	5-point Likert scale ranging from "not at all confident" to "completely confident."	2	Validity according to the authors that developed the measure	Chronbach alpha 0.89 <sup>28</sup>		Self-Efficacy
	COPE scale	1989	Self-report questionnaire	Long form 60, short form 28	4-point scale in 3 formats: 1) trait-like version: general behaviour when faced with stressful events 2) time-limited version:	15, 15	Convergent and discriminant validity	Test-retest reliability from 0.42 to 0.89, Cronbach alpha from 0.45 to 0.92 <sup>33</sup>	< 10	Coping strategies

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)
					behaviour had during a particular period in the past 3) time-limited version behaviour had during a particular period in the past up to the present					
	Connor-Davidson Resilience scale	2003	Self-report questionnaire	Long form 25, short form 10 and 2	5-point Likert scale ranging from 0-4: not true at all (0), rarely true (1), sometimes true (2), often true (3), and true nearly all of the time (4)	5, none	Construct, convergent, discriminant and predictive validity	Test-retest reliability 0.87, Cronbach alpha 0.89 <sup>112</sup>	> 50 languages	Resilience
Cognitive measures Cognitive abilities, health literacy and numeracy	Patient Activation Measures questionnaire	2005	Self-report questionnaire	Long form 22, short form 13	0–100 scale	4, none	Criterion-related validity	Rasch person reliability between 0.85 and 0.87, Chronbach alpha 0.87, Cohen's kappa 0.8-0.9 <sup>36,113</sup>	> 20 languages	Patient Activation
	Short Test of Functional Health Literacy in Adults	1999	Self-report questionnaire	36	Cloze procedure	2	No data	Chronbach alpha from 0.68 to 0.97 <sup>45</sup>	> 5	Health literacy
	Rapid Estimate of Adult Literacy in	1993	Self-report	Long form 66, short	Decode or	2, 2	Construct	Test-retest reliability 0.99,	< 5	Health literacy

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)
	Medicine		questionnaire	form 8	pronounce words		validity	Cohen's kappa between 0.67 and 0.88 <sup>46,114</sup>		
	Subjective Numeracy Scale	2007	Self-report questionnaire	8	6-point Likert-type scales	2	Predictive validity	Chronbach alpha from 0.75 to 0.84 <sup>55</sup>	< 5	Health literacy
	Chew's Set of Brief Screening Questions	2004	Self-report questionnaire	3	5-point Likert scale	None	Validity according to the authors that developed the measure	Reliable according to the authors that developed the measure <sup>48</sup>	< 5	Health literacy
	eHEALS questionnaire	2006	Self-report questionnaire	8	5-point scale from 'Strongly Disagree' to 'Strongly Agree'	None	Construct validity	Test-retest reliability 0.40; Chronbach alpha 0.88; Rasch person reliability 0.8 <sup>49</sup>	< 5	eHealth literacy
	General Decision-Making Inventory	1995	Self-report questionnaire	Long form 25, short form 13	5-point scale from 'Strongly Disagree' to 'Strongly Agree'	4, 4	Convergence and construct validity	Chronbach alpha from 0.68 to 0.94 <sup>42</sup>	< 5	Decision style

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)	
	Risk attitude	Domain-Specific Risk-Taking Scale	2002	Self-report questionnaire	40, 30 on risk taking (30 for an optional II part on risk perception )	7-point rating scale ranging from 'Extremely Unlikely' to 7 'Extremely Likely' (7-point rating scale ranging from 'Not at all [risky]' to 'Extremely Risky')	5	Discriminant and convergent validity	Test-retest reliability 0.42 – 0.80 Cronbach alpha from 0.69 to 0.84 (Part II risk perception from .70 to .81) <sup>59</sup>	>5 languages	Propensity to risk
		Balloon Analog Risk Task	2002	Computerized task	60 trials	Computer mouse to click	N.A.	Criterion validity	Test-retest reliability 0.77, Cronbach alpha 0.7 <sup>58,115</sup>	<5 languages	Propensity to risk
Individual differences measures Personality and dispositional factors	Tridimensional personality questionnaire	1991	Self-report questionnaire	100	True/false format	12	Construct, structural and external validity	Test-retest reliability from 0.70 to 0.79, Cronbach alpha from 0.44 to 0.85 <sup>66,116</sup>	< 5	Personality	

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)
	Millon Clinical Multiaxial Inventory	1992	Self-report questionnaire	195	True/false format	28	Construct, structural, discriminant, convergent, external and theoretical-substantive validity	Test-retest reliability from 0.73 to 0.93, Cronbach alpha from 0.80 to 0.84 <sup>71</sup>	< 5	Personality
	Temperament and Character Inventory	1999	Self-report questionnaire	240	True/false format	29	Convergent, predictive, and structural validity	Test-retest reliability 0.66 to 0.82; Cronbach alpha from 0.51 to 0.83 <sup>69</sup>	> 10 languages	Personality
	The NEO Five-Factor Inventory	1989	Self-report questionnaire	60	5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'	5	Discriminant and construct validity	Test-retest reliability 0.86 to 0.90; Cronbach alpha from 0.68 to 0.86 <sup>35,117</sup>	> 10 languages	Personality
	Big Five Inventory	1991	Self-report questionnaire	44	5-point scale ranging from 'disagree strongly' to 5 'strongly agree'	5	Discriminant and construct validity	Test-retest reliability from 0.75 to 0.90, Cronbach alpha from 0.79 to 0.88 <sup>63,118</sup>	> 10 languages	Personality

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)
	Big Five Inventory-54		Self-report questionnaire	54	5-point ratings (1 'strongly disagree' to 5 'strongly agree')	5	Construct validity with other measures of the Big Five <sup>119</sup>	Cronbach's alphas for the subscales range from .75 to .90, with an average above .80 <sup>118,119</sup>	> 10 languages	Personality
	Life Orientation Test Revised	1994	Self-report questionnaire	10	4-point scale from 'strongly disagree' to 'Strongly agree'	none	Predictive and discriminant validity	Test-retest reliability 0.79, Cronbach alpha 0.78 <sup>75,109</sup>	> 10 languages	Optimism
	Assertive-Behavior Competence Inventory	1998	Self-reported questionnaire	50 (25 items repeated)	Degree of discomfort if performing a behaviour: 5-point scale ranging from 1 (none) to 5 (very much) Likelihood of performing a behavior: 5-point scale from 1 (never do it) to 5 (always do it)	2	Internal consistency	Cronbach alpha from 0.86, 0.85 <sup>30</sup> .	-	Assertiveness
	Right-Wing Authoritarianism Scale	1988	Self-reported questionnaire	32	9-point scale ranging from -4 (very strongly disagree) to +4 (very strongly agree).	NA	Internal consistency	Cronbach alpha from 0.90 to 0.95 <sup>30,120</sup>	-	Conservatism

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)
Health locus of control, autonomy and control preference	The Health Orientation Scale	1988	Self-report questionnaire	50	5-point Likert scale	10	Internal validity	Test-retest reliability 0.82 – 0.96 Cronbach alpha from 0.69 to 0.92 <sup>72</sup>	> 10 languages	Personality tendencies associated with health
	Health Locus of Control Scale	1976	Self-report questionnaire	11	5-point scale from 'Strongly Disagree' to 'Strongly Agree'	3	Concurrent, internal, discriminant, construct validity	Test-retest reliability 0.67 – 0.77 Cronbach alpha 0.84 <sup>82,83</sup>	> 20 languages	Health locus of control
	Multidimensional Health Locus of Control Scale (Form B)	1978	Self-report questionnaire	18	6-point Likert scale from 1 'Strongly disagree' to 6: 'Strongly agree'	3 (six-item subscales)	Content validity, Concurrent validity, Construct validity Internal validity	Cronbach alpha ranging from .70 to .87 for Internality, .58 to .79 for Powerful Others, and .49 to .79 for Chance Test-retest reliability r = .61 for Internality, r = .75 for Powerful Others, and r = .70 for Chance subscales <sup>121</sup> .	>5 languages	Health locus of control

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)
Emotion and mood measures	Multidimensional Health Locus of Control Scale (Form C)	1994	Self-report questionnaire	18	5-point scale	4	Content validity, Concurrent validity, Construct validity Internal validity	Test-retest reliability 0.58 – 0.74 Cronbach alpha from 0.66 to 0.79 <sup>84,122</sup>	>5 languages	Health locus of control
	Center for Epidemiological Studies-Depression scale	1977	Self-report questionnaire	20	4-point scale from 'Rarely or none of the time (less than 1 day)' to 'Most or all of the time (5-7 days)'	2	Convergent – divergent validity; construct, internal validity	Test-retest reliability 0.79–0.85; Cronbach alpha from 0.81 to 0.86 <sup>97</sup>	> 20 languages	Depression/ mood
	Hospital Anxiety and Depression Scale	1983	Self-report questionnaire	14	4-point scale ranging from 0 to 3	2	Convergent – divergent validity; construct, internal validity	Test-retest reliability 0.70 – 0.84; Cronbach alpha from 0.65 to 0.90	> 20 languages	Anxiety and depression
	Spielberger State-Trait Anxiety Inventories	1970	Self-report questionnaire	40	4-point scale from 'Almost Never' to 'Almost Always'	2	Convergent – divergent validity; construct, internal validity	Test-retest reliability 0.65 – 0.75; internal consistency coefficients for the scale from .86 to .95; Cronbach alpha from 0.31 to 0.86 <sup>92</sup>	> 20 languages	State and trait anxiety
	Profile Of Mood States	1971	Self-report questionnaire	65	5-point rating scale from 0 for 'Not at all' up to 4 for 'extremely'	6	Convergent – divergent validity; construct, internal validity	Test-retest reliability 0.65 – 0.74 Cronbach alpha from 0.63 to 0.96 <sup>90</sup>	> 20 languages	Mood measures

Category	Instrument's name	Year of Publication	Type of measure	Number of items	Response Format	N° of subscales	Validity	Reliability	Language/translation	Construct(s)
Health Beliefs	Beliefs about Medicines Questionnaire	1999	Self-report questionnaire	18	5-point scale from 'Strongly Agree' to 'Strongly Disagree'	4	Predictive, construct and internal validity	Cronbach alpha > 0.86 <sup>123</sup>	> 10 languages	cognitive representations of medication

*All references refer to both validity and reliability indice*

